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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/29/97, 483 07/19/99 SEKI

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IM52/0201

EXAMINER

CLEVELAND, M	
ART UNIT	PAPER NUMBER

1762

DATE MAILED:

02/01/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/297,483

Applicant(s)

Seki et al.

Examiner

Michael Cleveland

Group Art Unit

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☒ Responsive to communication(s) filed on Nov 22, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1035 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 37-61 is/are pending in the application

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 37-61 is/are rejected

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☒ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17 2(a))

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s) _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
Each Figure (i.e., "Figs. 1A, 1B, ... and 1E") must be listed separately in the Brief Description of the Drawings.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 59-61 (as they depend on claim 58) are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 59-61 (as they depend from claim 58) are vague and indefinite because it appears that the formed hole-injecting and transporting layer containing the composition of claim 58 must contain the polar solvent of claim 58. It does not appear that such a device would be operable because the overlying layers would not adhere to the underlying layers and because it appears that the presence of the solvent would interfere with the workings of the device.

4. Claims 59-61 (as they depend from claim 58) rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure teaches that the compositions are dried after application. Therefore, Applicant has not demonstrated the

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possession of the invention of the use of an EL device which includes a solvent in a hole-injecting layer.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 48, 55, and 59-61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 48 is indefinite because the metes and bounds of the claim are unclear because the scope of the term "and their derivatives" is uncertain.

Claim 55 is vague and indefinite because it does not describe sufficient steps to form an organic EL element.

Claims 59-61 (as they depend from claim 58) are vague and indefinite because it appears that the formed hole-injecting and transporting layer containing the composition of claim 58 must contain the polar solvent of claim 58. It does not appear that such a device would be operable because the overlying layers would not adhere to the underlying layers and because it appears that the presence of the solvent would interfere with the workings of the device. For the purposes of examination, the Examiner has assumed that the claims refer to a EL device formed with the composition of claim 58 and wherein the composition is subsequently dried, as described in the specification.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

8. Claims 57 and 58 are rejected under 35 U.S.C. 102(e) as being anticipated by Jonas et al. (U.S. Patent 6,004,483, hereafter '483).

The Example shows the formation of a polyethylenedioxythiophene (PEDT) dispersion that includes polystyrenesulfonic acid (PSS) in water, a polar solvent. Applicant's disclosure teaches that such a composition may be used as a hole-transporting material. Therefore, the composition is a hole-transporting material in a polar solvent.

9. Claims 57-61 are rejected under 35 U.S.C. 102(e) as being anticipated by Jonas et al. (U.S. Patent 5,766,515, hereafter '515).

The Example shows the formation of a polyethylenedioxythiophene dispersion that includes polystyrenesulfonic acid in water, a polar solvent. Such compositions may be used as the transparent electrode (which is usually the anode, or hole-injecting electrode) (col. 3, lines 5-67). Thus, it is hole-transporting.

Claim 60: The thickness may be 10 nm (i.e., less than 0.1 microns (100 nm)) (col. 3, lines 66-67).

Claim 61: '515 is silent as to the film resistance of the hole transporting layer. Applicant's disclosure (particularly Table 13) suggests that the resistance is an inherent property that depends on the thickness of the film and the deposition method. The Examiner recognizes that the above described prior art deposits layers of copper phthalocyanine via a vapor deposition process, whereas Applicant deposits copper phthalocyanine via an ink jet deposition process. (Thicknesses that achieve Applicant's claimed range of resistances range from 200-1400 angstroms, as described in Table 13.) Therefore, the layers described in '515 would reasonably appear to inherently possess resistances in Applicant's claimed range. However, the PTO does not have testing facilities to determine the resistances.

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10. Claims 57 and 59-61 are rejected under 35 U.S.C. 102(e) as being anticipated by Heeks et al. (U.S. Patent 5,965,901, hereafter '901).

'901 teaches an electroluminescent device that uses an anode (i.e., a hole-injecting-layer) of a PEDT/PSS as thin as 50 nm (col. 4, lines 17-42). Although the PEDT/PSS composition is deposited by spin coating (col. 5, lines 27-35) rather than via ink-jet print head, the layer appears to be the same composition and thickness as that claimed, and therefore appears to be identical to the claimed product.

'901 is silent as to the film resistance of the hole transporting layer. Applicant's disclosure (particularly Table 13) suggests that the resistance is an inherent property that depends on the thickness of the film and the deposition method. The Examiner recognizes that the above described prior art deposits layers of copper phthalocyanine via a vapor deposition process, whereas Applicant deposits copper phthalocyanine via an ink jet deposition process. (Thicknesses that achieve Applicant's claimed range of resistances range from 200-1400 angstroms, as described in Table 13.) Therefore, the layers described in '901 would reasonably appear to inherently possess resistances in Applicant's claimed range. However, the PTO does not have testing facilities to determine the resistances.

11. Claims 59-60 (as they depend from claim 58) are rejected under 35 U.S.C. 102(b) as being anticipated by Shi et al. (U.S. Patent 5,554,450, hereafter '450).

Shi et al. teaches an organic EL device that include hole-transporting materials, such as hole-transport layer (208). Applicant's claim to forming such a layer using a polar solvent does not distinguish over the prior art because the solvent dries, and is not present in the final product. Therefore, the product of '450 appears to be identical to that of Applicant's claim 59. Layer thickness of less than 100 nm are suggested at col. 18, lines 32-49.

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Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 37-47, 52-53, 56-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (U.S. Patent 5,725,407, hereafter '407) in view of Cao '281 and Jonas '515.

Claims 37, 52, 56-59: '407 teaches a manufacturing process of an EL device, comprising the steps of forming partitioning members (2) on a substrate having openings corresponding to pixels on a substrate, and filling the opening with an anode material (3) (i.e., a hole injecting and transporting layer).

'407 does not teach that the EL device is an organic device, that the anode is filled from an ink-jet printhead using PEDT and PSS and a solvent and drying the composition.

'407 teaches the use of inorganic phosphors to form the EL device. However, the use of organic electroluminescent material to form similar EL devices is extremely well known in the art. See, for instance, '281 (Abstract). '407 uses an ITO anode formed by sputtering (col. 3, lines 11-16). However, other anode materials are very well known in the art. For instance, '281 teaches that polythiophene may be used as the anode instead of ITO (col. 10, lines 16-37). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used organic EL material rather than inorganic phosphors and a polythiophene anode instead of the ITO anode with the expectation of similar results.

'281 does not describe a method of depositing a polythiophene film. '515 teaches that a polythiophene films suitable for deposition as electrodes in EL devices (col. 3, lines 5-67) are formed using compositions including PEDT and PSS and a solvent (Example and claims 1 and 3). '515 teaches that such compositions may be applied by liquid coating methods including printing methods (col. 2, lines 51-57). Although ink-jet printing is not explicitly disclosed, ink-

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jet printing is a notoriously well-known printing method. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ink-jet printing to have deposited the polythiophene film in the EL device suggested by '407 and '281 with a reasonable expectation of success. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made that such a method would have simplified the process. The method of '407 indicates that the anode layer is deposited uniformly over the partition walls and then selectively removed from the tops of the partitions in order to isolate the electrodes within each opening. However, ink-jet printing is a well-known method of supplying material to selected locations. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ink-jet printing to have selectively deposited anode material in each opening in order to have made the process more efficient by eliminating the selective removal step. '515 teaches that the applied film is then dried (col. 2, lines 51-57). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have dried the film after depositing it.

Claims 38-44: The Examiner takes Official Notice that factors such as the flowability of an ink and its wetting ability on a surface are well known parameters in coating processes. The flowability and wetting ability are controlled by the viscosity, surface tension, and contact angle with any dispensing nozzle of the solution. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the viscosity, surface tension, and contact angle with the ink-jet nozzle for the optimum flow and wetting properties. The composition of Example 1 of '515 has a weight percent within Applicant's claimed ranges (about 0.5 %).

Claims 45-47: The solvent may be polar solvents, such as water, or water mixed with lower alcohols, such as ethanol.

Claims 53 and 60: Thicknesses of less than 1 micron are taught in '515, col. 3, lines 66-67.

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14. Claims 48-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu '407 in view of Cao '281 and Jonas '515 and further in view of Taniguchi et al. (U.S. Patent 5,667,572).

'407, '281, and '515 are discussed above. '515 teaches that the solvent for the polythiophene (i.e., an ionic polymer) dispersion (i.e., ink) may be a mixture of water with water-miscible solvents, but none of the references suggest ethoxyethanol or glycerin, nor that the dispersion is formed by sonicating and ultrafiltering.

Claims 48-51: '572 teaches the preparation of inks that contain ionic polymers (col. 8, lines 13-32) may be made in mixtures containing water-miscible organic solvents, such as glycerin and ethoxyethanol (col. 7, lines 31-57). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used such water-miscible solvents as ethoxyethanol or glycerin as the solvents mixed with water in the polythiophene inks of '515 with the expectation of similar results.

15. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu '407 in view of Cao '281 and Jonas '515, Taniguchi '572, and further in view of Itoh et al. (U.S. Patent 5,690,721).

'407, '281, '515, and '572 are discussed above. '572 teaches that the inks may be dispersed by sonicating (col. 11, lines 7-10), but does not explicitly describe the filtration of the inks. '572 also teaches that the particle size in the ink should be regulated to prevent clogging (col. 2, lines 36-44), but does not explicitly teach that this is done by filtration.

'721 teaches that such ink-jet inks may be filtered after mixing. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have filtered the ink of '515 after mixing in order to achieve a desired dispersion particle size to have prevent ink jet clogging.

16. Claims 54 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu '407 in view of Cao '281 and Jonas '515 and further in view of Jonas '483.

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'407, '281 and '515 are discussed above but do not explicitly teach surface resistances within Applicant's claimed ranges. However, Jonas '483 indicates that similar polythiophene films to Jonas '515 can be printed with surface resistances of 10^{10} to 0.1 ohm/square (col. 4, lines 35-36), which overlaps Applicant's claimed range. The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549.

Response to Arguments

17. Applicant's arguments filed 10/10/00 and 11/22/00 have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 37-61 have been considered but are generally moot in view of the new limitations and the new ground(s) of rejection.

The following arguments were considered relevant to the new grounds of rejection but unpersuasive:

Applicant's argument that Shi '450 does not use a polar solvent is unconvincing because the solvent dries, and is not present in the final product. Therefore, the product of '450 appears to be identical to that of Applicant's claim 59.

Applicant's arguments that Itoh '721 and Taniguchi '572 are not disclosed as related to EL devices is noted. However, these patents are cited primarily for their teachings of the preparation, properties, and solvents useful in producing inks. It is the Examiner's position that these patents represent the background knowledge of inks that one of ordinary skill in the art would have brought to bear when reading the Jonas patents.

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Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

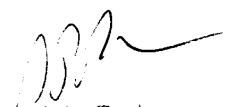
19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703)308-2331. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333.



Michael Cleveland

January 26, 2001


Shrive Beck
Supervisor
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